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Comparative cost assessment of refined wheat flour noodles and functional noodles enriched with protein and dietary fibres

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Abstract

In present investigation the cost economics for functional noodles enriched with protein and dietary fibres were studied. Noodles are known to be the most relished cereal-based snack foods all over world. For the noodles preparation, the ingredients such as refined wheat flour, chicken meat powder, jackfruit seed flour, salt, gaur gum, potato starch and water was used. These ingredients were properly kneaded for 10 minutes and was then extruded with the mini pasta making dolly to obtain the noodle strands. These noodles were then subjected to the solar drying at 55 -70 °C for 24 hrs. Thereafter these noodles were evaluated for qualities and cost of formulation were studied. The study revealed lower cost for control noodles prepared from refined wheat flour as compared to functional noodles having 20% chicken meat powder and 30% jackfruit seed flour. The cost of formulation of noodles witnessed variations due to the changes in the type of flour, change in the level of the chicken meat as well as variation in the processing cost. Therefore, development of the functional noodles enriched with protein and dietary was found less cost effective whereas more effective and nutritious while considering the standpoint of nutrition.

Keywords: Chicken meat noodles, refined wheat flour, jackfruit seed flour, potato starch, gaur gum

Introduction

In Asian countries, approximately 40% of wheat commodities are consumed in the form of noodles. Indian snack food industry estimated an annual growth rate of about 40 percent (MFPI, 2005) [4]. Snack food market also witnessed a growth in food sector which valued Rs 1530 crore in food sector. In present era, various factors such as rapid urbanization, changing food habits and lifestyles, women engaged in outdoor jobs, increasing interest of school going children has resulted in larger consumption and growth of noodle markets.

According to Asian culture, Noodles symbolized long life and good luck (Sowbhagya and Ali, 2001) [6]. World noodle market is projected to reach 158.7 billion packs by the year 2010 (Anonymous, 2008) [1] as noodles were a convenient source of food, easy to cook, low cost and have a relatively long shelf-life. Poor source of protein is one of the major problems seen in most of the today's snack foods which are cereal based. Refined wheat flour protein is poor in lysine and relatively higher in sulphur-containing amino acids (methionine and cysteine). Most of the snacks available in the present market are higher in fat content and calories but poor in protein, vitamins and other nutrients (Ranhotra and Vetter (1991) [5]. Therefore, studies giving maximum emphasis on increasing proteins of high biological value in snack foods can be beneficial and can eradicate the problems of malnutrition. It was also observed that the Indian poultry industry was benefited by the possible utilization of chicken meat in noodles as it will not only enhance the nutritive content of noodles but will provide an alternate for value addition of chicken meat (Verma *et al.*, 2012) [7]. Keeping these facts in mind, chicken meat was selected for developing noodles by using jackfruit seed flour, refined wheat flour and other ingredients.

Although a lot of work has been done to improve the functional and nutritive value of noodles through changes in formulations and processing technology it was observed that very little efforts were put on the cost assessment of formulations. Therefore, studying for the development and improvement of novel and acceptable noodles fulfilling consumer demands are imminent in today's world market as it is much diversified (Ge *et al.*, 2001) [2]. Hence, the present study was focused to access the comparative evaluation of the cost of formulation of functional noodles enriched with protein and dietary fibres.

Materials and Methods

Procedure of preparation: The deboned meat chunks were double minced using 6 mm and 4 mm grinder plates to get fine minced chicken meat (MCM) according to the method proposed by Ilansuriyan *et al.* 2015^[8] with minor modifications. Jackfruit seed flour was processed by the method outlined by Ruka *et al.*, (2019)^[9]. The required ingredients such as refined wheat flour, chicken meat powder and jackfruit seed flour were further kneaded with water for 10 minutes and then extruded through the mini pasta making dolly, cut and collected into rectangular shaped steel trays. The trays were kept in solar dryer at 55 -70 °C for (24hrs)

drying. The dried and cooled noodles were packed in HDPE and sealed with the help of a sealer (Singhal®, HSP200, India). The cost of production of taste maker was calculated as given in Table 1 and production cost of functional noodles enriched with protein and dietary fibres was calculated in Table 2. The labor charges for noodles preparation were calculated on the basis of two daily paid labor's for half day used in both the products preparation equal for both (T1, and T2) = Rs 100 /day x 2 = Rs 200 (Rs 100 for each) The miscellaneous charges were assumed to be Rs. 15 for ingredients used in the experiment.

Table 1: Production cost of taste maker

Name of Ingredient in %(w/w)	Amount	Rate (Rs/kg)	Approx cost (Rs.)
Coriander powder	20	344	6.88
Red chilies (dried)	15	530	7.95
Aniseed	15	820	12.3
Black pepper	13	1000	13
Cumin seed	10	650	6.5
Dried Ginger	10	800	8
Cinnamon	5	1400	7
Cloves	5	3490	17.45
Turmeric	5	220	1.1
Cardamom	2	8600	17.2

The production cost for T1 (refined wheat flour) and T2 (functional noodles) based on jackfruit seed flour and chicken meat powder were calculated on the basis of the market price of the various ingredient uses for the making the noodles.

Table 2: Production cost of functional noodles enriched with protein and dietary fibres

Ingredients cost	T1		T2		
	Rate	Quantity (in gm)	Cost (Rs)	Quantity (in gm)	Cost (Rs)
Refined wheat flour	30	982.12	29.46	446.40	13.39
Chicken meat powder	1833.34			178.50	327.25
Jackfruit seed flour	100			267.8	26.78
Potato Starch	450			71.5	3.12
Gaur gum	1000			17.9	1.78
Salt	38	17.9	1.45	17.9	0.06
Total for 1 kg		1000	30.91	1000	372.38
Total for 10 kg		10000	309.1	10000	3723.8
Electric charges for T1 and T2					
Equipment	T1		T2		
	Watt x hrs	KWH Unit	Watt x hrs	KWH Unit	
Hot air oven	1100 x 8	8.800	1100 x 11	12.100	
Mincer	-		400 x 0.3	0.120	
Grinder	-		400 x 0.167	0.0668	
Packaging Machine	250 x 0.800	0.200	250 x 0.800	0.200	
Light, fan etc..	300 x 2	0.600	300 x 2	0.600	
Total		9.600		12.1009	
Electricity charges (4.5/per unit)		(9.6 x 4.5) = 43.20		54.45	
Depreciation of equipment's used in the study was @ of 10% of the total cost of equipment's on annual basis Equipment C					
Equipment					Cost (Rs)
Hot air oven					8000
Mincer					2000
Grinder					3500
Sealing Machine					1200
Stainless steel tray, knives etc.					2000
Total					16700
Depreciation @ 10% per annum					
Per day basis = Rs 4.57					1670

Packaging cost: The cost of the HDPE pouch was Rs. 0.30 /pouch so the total cost of the pouch used in the packaging of was functional noodles enriched with protein and dietary fibres (8 x 0.30) = Rs. 2.40. The cost of packaging materials in both products were almost similar.

Results and Discussion

Total overhead cost: The total overhead cost was the summation of labour charge Rs.50, electricity charges Rs. 43.20, depreciation charges Rs. 4.57, miscellaneous charges Rs. 15 and cost of packaging cost Rs. 2.40, so total overhead

cost for the functional noodles enriched with protein and dietary fibres were Rs. 372.38.

Production cost of functional noodles enriched with protein and dietary fibres: Production cost obtained after the summation of the cost of formulation and the cost of overhead production was Rs. 146.8. In the case of functional noodles enriched with protein and dietary fibres the production cost was Rs. 487.55.

Percent yield: The percent yield of the functional noodles enriched with protein and dietary fibres was similar when compared along with control.

Cost of taste maker per gm: The cost of production of the taste maker was calculated by the addition of cost of all ingredients used in the preparation of the noodles. In addition of these values the total cost of noodles taste maker was Rs. 973.8 /kg.

Cost of production per pack including (80 gm noodles + 8 gm taste maker): The cost of production of functional noodles enriched with protein and dietary fibres per pack including functional noodles enriched with protein and dietary fibres (80 gm) and taste maker (8) was calculated as the cost of one gm of noodles. On 10 kg basis the cost of noodles will be Rs 309.1 for Control and Rs 3723.8 for Functional noodles. However, additional cost Rs 973.8 for 1kg taste maker will also be added. So, the total cost for 10 kg noodles along with taste maker will be 1282.9 for Control and 4032.9 for functional noodles. The cost will be higher than the available vegetable or cereal based noodles in the market but this cost of product is quite justifiable due to the higher nutritional value.

Cost formulation of noodles witnessed slight variations due to cost of the flour and different level of meat used in the preparation of functional noodles resulted in the variation in the formulation of cost. Ingredients played a major role in cost formulation as the formulation cost for noodles and taste maker was dependent on the ingredients used. Some of the cost formulations were also tried by Nissar *et al.* (2009) [10]. Study conducted stated that the cost of production for functional noodles enriched with protein and dietary fibres was higher than the control noodles due to the higher incorporation of chicken meat powder.

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